STATE OF NEW HAMPSHIRE
American Recovery and Reinvestment Act

DRINKING WATER SRF GUIDANCE FOR GREEN INFRASTRUCTURE APPLICATIONS

The American Recovery and Reinvestment Act of 2009 (ARRA) states that "..to the extent there are sufficient eligible project applications, **not less than 20 percent of the funds** appropriated herein for the Revolving Funds shall be for projects to address green infrastructure, water or energy efficiency improvements or other environmentally innovative activities." This guidance is provided to assist community water systems to apply for priority funding of green infrastructure projects and/or improved ranking of traditional projects with green components under the ARRA-DWSRF.

GREEN INFRASTRUCTURE CATEGORIES

- Energy and Water Efficiency
- Green Infrastructure including Leadership in Energy and Environmental Design (LEED) projects
- Environmentally Innovative Projects

BUSINESS CASE REQUIREMENTS

DES will rank all pre-applications for green infrastructure and others that substantially improve water and/or energy efficiency in accordance with criteria published in the DWSRF Intended Use Plan, and will notify eligible loan recipients if a green project "Business Case" is required as part of the final project application. The Business Case must state clearly how the project advances the objectives of one or more of the green project categories. Specific guidance and example projects are detailed herein.

1. Business Case for Energy and Water Efficiency Projects

Documentation may include a brief technical memorandum and supporting calculations or references to other engineering or planning documents indicating the basis on which the project is judged to qualify as green infrastructure. Projects that document at least 20% water and/or energy efficiency will receive priority, but others should also document the calculated efficiencies to receive points in this category.

Energy Efficiency - includes capital projects or portions of projects that reduce the energy consumption of eligible drinking water infrastructure projects. Clean energy includes wind, solar, geothermal, hydroelectric, and biogas combined heat and power systems. Additional information on energy efficiency and clean energy projects may be obtained at EPA's clean energy site www.epa.gov/cleanenergy/ and EPA's Better Management-Energy page www.epa.gov/waterinfrastructure/bettermanagement_energy.html.

Eligible energy efficiency projects may include:

a. Planning and design activities for energy efficiency that are expected to result in a capital project.
b. Building activities that implement energy efficiency.
c. Costs associated with a utility energy audit if required as a condition of assistance.

Project examples:

- Energy efficient retrofits and upgrades to pumps and treatment processes (requires business case)
- Leak detection equipment
- Producing clean power for treatment systems on site (wind, solar, hydroelectric, geothermal, biogas powered combined heat and power).

Water Efficiency – includes capital projects or portions of projects where improved technologies and practices are used to deliver equal or better services with less water. Additional information is available through EPA's WaterSense program at http://www.epa.gov/watersense/water_efficiency/util.html.

Eligible costs associated with water efficiency projects may include:

a. Planning and design activities for water efficiency that are expected to result in a capital project.
b. Purchase of water efficient fixtures, fittings, equipment, or appliances (e.g., fixtures or products certified by WaterSense).
c. Purchase of leak detection devices and equipment.
d. Purchase of water meters, meter reading equipment and systems.
e. Upgrade of existing water meters and systems to facilitate reading / billing (requires business case).
f. Construction and installation activities that implement capital water efficiency projects.
g. Costs associated with development of a water conservation plan or water audit if required as a condition of DWSRF assistance.

Project examples:

- Installation of water meters or automated meter reading systems.
- Upgrade of water meters to automated meter reading systems (requires business case).
- Retrofit or replacement of water using fixtures, fittings, equipment or appliances (including rebate programs).
- Distribution system leak detection equipment.

2. Business Case for Green Infrastructure Projects

Green Infrastructure projects may be stand-alone projects or eligible portions of larger capital projects. In the context of the DWSRF, green infrastructure consists of site-specific practices, such as green roofs and porous pavement at drinking water utility facilities which, in addition to managing rainfall, provide other benefits such as reduced energy and/or water demands.

Drinking water projects certified under the U.S. Green Building Council Leadership in Energy and Environmental Design (LEED) program will also be considered under the DWSRF green project reserve. The LEED certification system is a third-party verification that a building is designed and built using strategies to maximize energy savings, water efficiency, reduction of CO_2 emissions, improved indoor environmental quality, and sustainable stewardship of resources.

Project examples:

- Construction of wet weather management systems for utility buildings and parking areas such as the incremental cost of porous pavement, bioretention, trees, green roofs, and other practices that mimic natural hydrology and reduce effective imperviousness.
- LEED certified water treatment, pumping facilities or other utility building structures.

3. Business Case Requirements for Environmentally Innovative Projects

Within the context of the DWSRF program, "environmentally innovative projects" include those that are:

a. consistent with the underlying project eligibilities of the DWSRF program; and
b. consistent with the timelines and objectives of the ARRA; and
c. that demonstrate new and/or innovative approaches to delivering service and/or managing water resources in a more sustainable way, including projects that achieve public health protection and environmental protection objectives at the least life-cycle costs.

Environmentally innovative projects can be stand alone projects. They do not need to be part of a larger capital improvement project. Project examples are:

- Project activities that enable the utility to adapt to the impacts of global climate change.
- "Total Water Management" planning activities, or other planning framework within which project life cycle costs including infrastructure, energy consumption and other operational costs are minimized.

EXAMPLE BUSINESS CASES FOR GREEN INFRASTRUCTURE FUNDING

Ref: EPA Green Project Reserve Business Case examples, Jun 2009 (www.epa.gov/water/eparecovery/docs/2009_6_22_GPR_Q_A.pdf)

EPA does not endorse any specific format for green project business cases provided adequate justification and supporting documentation are included. Data references may include annotated engineering reports, water or energy audit information, and/or results of water system tests that may exist in project files. Examples are provided below.

Business Case Example #1 - Existing Water Meter Replacement

Summary

- Replacement of all water meters to eliminate 514 million gallons of water loss per year (MGY).
- Loan amount $750,000
- Water saving (green) portion of loan 100%
- Annual water savings 514 million gallons (MG)

Background

- The water system serves 800,000 people and has approximately 320,000 residential connections. Total annual water use is 51,388 million gallons or 141 millions gallons per day (MGD).
- Water meters were installed at all connections in 1982, and the manufacturer specified that the meters' useful life would be approximately 25 years. The meters were due for replacement in 2007.
- Increased water loss, due to leaks and inaccurate readings, are attributed to the old meters.[1]

Results

- Based on the manufacturer's statement a 25-year-old meter is estimated to be 99% accurate (down from 99.9% at installation) and a 30-year old meter is estimated to be 82% accurate.[2]
- Annual water loss attributed to existing meters is estimated at 514 million gallons (1% of annual production) and is expected to worsen over time.
- It takes 1.50 kilowatt hours (kWh) of electricity to treat 1,000 gallons of water. At a cost of 10 cents per kWh, the water loss costs the system at least $77,000 annually from the electricity required for treatment and pumping.[3]
- The estimated cost of the meter replacement project is $750,000; the project will pay for itself in less than 10 years.

Other Benefits

- Replacing the old, leaking meters will increase water efficiency by decreasing the amount of water lost and by providing more accurate water-use information to customers and the system.

Conclusion

- A savings of $77,000 in annual electricity costs will be realized as a result of reducing water lost from malfunctioning meters by 514 MG.
- Accurate metering of water consumption is an important conservation measure because inaccurate metering provides customers with misleading information regarding water consumption. Providing more accurate water bills will send a stronger price signal to customers and will result in more efficient consumption.
- Water leakage and inaccuracy increases with water meter age; therefore, an investment in water meters today will lead to additional water and dollar savings over time. Also, the water savings from the meter replacement will extend the life of the water supply and delay capital expansion projects.

References

1 Water Audit Summary Report for Hypothetical Water System. Updated August 2008.

2 User's Manual for Hypothetical Brand Residential Meters. January 1982.

3 Calculations based on electricity bills and total annual water use for 2008.

Business Case Example #2 – Storage Tank Replacement to Reduce Water Losses

Summary

- Replacement of water storage Tank A will improve water efficiency of the system by eliminating 7.2 million gallons of annual water loss and provide additional water storage capacity.
- Loan amount $510,000
- Water savings (green) portion of loan 100%
- Annual water savings 7.2 million gallons (MG)

Background

- Tank A is 150 feet below Tank B. This configuration prevents water from flowing out of Tank A when Tank B is at normal operating levels (pressure difference of 65 pounds per square inch).
- Due to the current configuration, the water in Tank A stagnates and loses its residual chlorine. The tank must be emptied and refilled weekly to ensure that potable water is available.
- Approximately 7,200,000 gallons of water (5.9% of current use) is drained annually from the 150,000-gallon Tank A.

Results

- Replacing Tank A with a larger storage tank at the same elevation as Tank B will enable both tanks to drop and fill at similar levels, thus reducing the 7,200,000 gallons of stagnant water that must be discarded annually.
- The annual water savings are calculated at $55,000. The simple payback period on this investment is less than 10 years.[1]
- Construction of a new water storage tank is the most cost-effective and sustainable solution.[2]
- The new storage tank will save 7,200,000 gallons of water each year and reduce the system's treatment costs.
- With a capacity of 340,000 gallons, the new tank will decrease water waste, improve service pressure, and increase the reliability of the system's infrastructure.
- Implementing the project will delay the need for plant expansions and will reduce the amount of water taken from the source water body, which is important for maintaining the quality of its habitat, especially during droughts.

References

1 Preliminary Engineering Report for the Storage Tank Replacement Project. March 2009.
2 Preliminary Engineering Report for the Storage Tank Replacement Project. March 2009.

Business Case Example #3 – Pump and Motor Replacement

Summary

- Large-scale pipe replacement project includes replacement of high-service pump station with two large pumps and motors.
- Estimated loan amount $2,800,000
    - $2,600,000 pipe replacement
    - $200,000 pump and motor replacement
- Estimated energy efficiency (green) portion of loan is 8% ($200,000)
- Estimated annual energy savings range from 22.9% to 24% or up to $2,934 per year.

Background

- The high-service pump station equipment is about 30 years old. The existing pumps are rated at 600gpm at 154 feet with a manufacturer-rated efficiency of 77%. Existing motors were rated at 85%. The actual operating efficiency probably is lower because of the age of the pump system.
- Estimated energy consumed by existing pumps is 116,400 kW annually.[1]

Results

- The proposed new pumps will have a rated efficiency of 89%.[2]
- The proposed new motors will have a rated efficiency of 93.5%.[3]

Calculated Energy Efficiency Improvements

- Standard pumps on the market have average efficiency ratings of 72.5%.
- Standard motors on the market have average efficiency ratings of 89%.[4]
- The efficiency (wire-to-water) of standard pumps and motors = 72.5% * 89% = 64.5% (pump efficiency times motor efficiency).
- The efficiency of proposed pumps and motors = 89% * 93.5% = 83.2%
- To compare the efficiency of proposed pumps and motors with standard pumps and motors, divide the total efficiency of the proposed components by the efficiency of the standard components: 83.2% / 64.5% = 1.29
- The increased wire to water efficiency is 29%. This level of efficiency exceeds the 20% recommended minimum for pumps and motors.

Conclusion

- By replacing the pumps and motors in the high-service pump station, the system will reduce energy use by 22.9% (for maximum day operation) to 24.0% (for average day operation) or 26,664 to 27,945 kW annually.[5]
- At 10.5 cents per kW, energy reductions from the new pumps and motors will save up to $2,934 per year. [6]

References

1 Calculations based on electricity bills and submeter electric data for 2008.

2 Hypothetical Manufacturer Pump Specifications. Fall 2008.

3 Hypothetical Manufacturer Motor Specifications. Spring 2009.

4 U.S. Department of Energy, 2005. When to Purchase NEMA Premium™ Efficiency Motors. Motor Systems Tip Sheet #1. DOE/GO-102005-2019.

5 Energy reductions results based calculation using an average of 600gpm, 154 TDH and operation of pumps for 12 hours a day.

6 Calculations based on electricity bills and submeter electric data for 2008 and estimated energy savings.